#13/Response
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| In re the Application of: | ) |
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| ETORI et al | ) Examiner: Cruz |
| | ) |
| Serial No.: 09/740,809 | ) Art Unit: 2851 |
| | ) |
| Filed: December 21, 2000 | ) |
| | ) **ATTENTION ART UNIT 2851** |
| For: A SEE-THROUGH LIGHT TRANSMITTING TYPE SCREEN | ) **EXPEDITED PROCESSING** |
| | ) **RESPONSE TO FINAL ACTION** |

RESPONSE TO FINAL REJECTION UNDER 37 CFR 1.116

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

This paper is in response to the "final" action of October 25, 2002. A petition for a two month extension of time has today been filed as a separate paper and a copy is attached hereto.

The Rejection for Anticipation by Watanabe et al (Paragraph 3 of the Final Action)

The rejection of claims 1, 4, 7, 10, 12-16 and 18-20 for anticipation by Watanabe et al is respectfully traversed for the reason that Watanabe et al nowhere disclose a "see-through" screen. The fact that Watanabe et al does not disclose a see-through screen becomes apparent from a careful consideration of the teachings of Watanabe et al with regard to particle size and distinctness of image.

Particle Size

A teaching regarding the diameter of particles (balls) is found at column 11, lines 44-62 of Watanabe et al. Here, it is described that the diameter of the ball is equal to or smaller than 100 μm. The upper limit of the diameter is determined from the viewpoint of resolution of the screen. While a lower limit is not specified, it is explained that if the size of the balls is too small, then it becomes difficult to dispose the balls in a single grain layer and so on.

In paragraph 3 of the office action, the examiner asserts that Watanabe et al teach "the spherical microparticles have a mean particle diameter of 1 μm - 10.0 μm" at column 11, lines 44-45. In paragraph 5 of the office action the examiner asserts that: "Watanabe et al (U.S. Patent No. 6,262,840 B1) teaches the salient features of the present invention, including the spherical microparticles having a mean particle diameter of 1.0 μm - 10.0 μm (column 11, lines 51-56)." In point of fact, the Watanabe et al reference contains no such teaching either at column 11, lines 44-45, at column 11, lines 51-56 or elsewhere. On the contrary, the teachings of Watanabe et al regarding the diameter of the "minute transparent balls" are as explained above. Contrary to the examiner's assertions, no teaching of a range of 1.0 - 10 microns for the diameter of the "balls" is to be found anywhere in Watanabe et al.

It is clearly understood that the invention of Watanabe et al is based on geometrical optics from column 12, lines 9-21 where Watanabe et al teach: "a light converging effect is determined in response to a value of the refractive index of the surrounding portions on the light incidence end side

of the minute transparent ball and a value of the refractive index of the minute transparent ball, and hence a diffusion angle on the light emission side of the minute transparent ball is determined".

It is well known in the art that light diffusion (scattering) by a spherical particle is determined by a size parameter (q), which is represented by $q = \pi D/\lambda$, wherein D is the diameter of the particle and $\lambda$ is the wavelength of the light in the medium. Geometric optics, i.e., the ordinary laws of reflection-refraction (Snell law, etc.) can be applied to a system where the size parameter is sufficiently large, that is, the diameter is sufficiently large relative to the wavelength of the light. However, if the size parameter (q) is too small, that is, if the diameter is too small, geometric optics cannot be applied. Especially, when the diameter (D) is very small ($q \ll 1$), Rayleigh scattering occurs and the incident light is scattered not only forward (direction of the incident light) but also backward in the same light amount. The ordinary refraction law (Snell law) does not apply in this situation.

There is a region between a system in which the ordinary refraction law applies and the Rayleigh scattering system. In this region, the diameter of particles (size parameter) is larger than that of the Rayleigh scattering system and smaller than that of geometric optics, typically more than 1 and less than 50 microns. Scattering occurring in this region is called Mie scattering, where the forward scattering is greater than the backward scattering and scattering is influenced by the particle diameter and not explained by the ordinary laws of refraction. Only in a system satisfying the conditions for Mie scattering can a see-through property and forward scattering be obtained simultaneously.

As clearly taught at page 1, lines 13-15 of applicants' substitute specification, the screen of the invention provides Mie scattering and therefore can simultaneously provide a see-through property and forward scattering. Particularly, the diameter of particles and the relative refractive index of the particles as recited in claim 5 are important parameters for imparting these properties to the screen. On the other hand, as afore-mentioned, the screen of Watanabe et al is based on geometric optics, not Mie scattering, and, therefore, the teachings of Watanabe et al do not enable such a see-through property.

Distinctness of Image

Haze and distinctness of image have a trade-off relationship. Specifically, when haze is high, diffusion becomes high and distinctness of image through a screen is lowered. Distinctness of image also changes depending on distance of an object from the screen. Even if the screen has a high diffusion, distinctness of image of an object becomes high when it is brought into contact with the screen. That is, the object can be seen well. Images focused on a screen, similarly to the object in close contact with the screen, can be seen well even through a screen having a high diffusion. However, this cannot be applied to the background of the object. The background, which is spaced from the screen, becomes vague if the screen has high diffusion.

Since the screen of Watanabe et al is designed to have a high diffusion, it should have a high haze value and any image of the background, which is spaced from the screen, becomes vague while an image of the object can be seen clearly. Particularly, because light through the screen of Watanabe

et al is scattered according to geometric optics as mentioned above, alignment of a light beam through the screen will be disordered and thereby the background cannot be observed. Thus, the screen of Watanabe et al cannot have a see-through property.

The Rejection of Claims 5 and 17 for Anticipation or Obviousness Over Watanabe et al

As noted above, Watanabe et al do not disclose use of any spheres or "balls" having a mean particle diameter within the ranges recited by claim 5 and/or claim 17. Indeed, such a particle size would be a departure from the design and intended function of the elements of Watanabe et al insofar as the elements of Watanabe et al operate in accordance with the principles of optical geometry whereas the particle size ranges recited by claims 5 and 17 are intended to produce Mie front-scattering (page 2, line 13 of applicants' Substitute Specification).

Further, the definition for relative refractive index recited by claim 5 is nowhere suggested by Watanabe et al. The teachings of Watanabe et al regarding refractive index of the minute transparent ball are found at column 11, lines 36-42 and column 12, lines 3-8. Here, they teach only that the refractive index of the ball is larger than 1.4 and larger than that of the surrounding binder (material of the protective transparent layer or the transparent layer) and that the ball can function as a lens. However, Watanabe et al do not teach how much larger, do not teach any relative refractive index (n) and do not teach anything relevant to a range for (n) of $0.91 \sim 1.09$ ($n \neq 1$). A teaching of a relationship between the refractive indices of the ball and the surrounding matrix or binder (relative refractive index) is also lacking at column 15, lines 2-6, on which the examiner also relies. The

teaching at column 15, lines 2-6 is only that the refractive index is changed from the center of the screen to the outermost periphery to make a light scattering property in the center of the screen higher and to reduce the amount of light towards front of the screen in the center, since the light scattering becomes higher as the refractive index of the ball increases. Nothing relevant to the relationship of the refractive indices (n) is found at column 14, lines 16-20 either.

The Rejection of Claim 6 (Paragraph 6 of the Office Action)

Regarding claim 6, Iwata et al have no teaching concerning the distinctness of image in the description at column 3, lines 24-28 or in Table 5, which the examiner mentioned. The examiner may have believed that "display quality" in Table 5 is the same as distinctness of image. However, "display quality" is different from distinctness of image because it is not an evaluation of image through the screen but, rather, an evaluation of the scattering layer laminated on the liquid crystal panel. See column 13, lines 45-49 of Iwata et al.

Accordingly, neither Watanabe et al nor Iwata et al teach or suggest a screen having not less than 3% haze and not less than 60% of distinctness of image. Further, neither discloses a see-through screen.

In conclusion, it is respectfully requested that the examiner reconsider the rejections of record with a view toward allowance of the pending claims.

Respectfully submitted,

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